

# *Soaking the Sponge: Science and Policy Considerations of Shallow Aquifer Recharge*

Association of  
Montana Floodplain  
Managers

Fairmont Hot Springs  
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# ***Enhancing Streamflows Through Shallow Aquifer Recharge -***

## **Shallow Aquifer Recharge Overview –**

- The importance of natural systems, floodplains, and stream/floodplain connectivity.

## **Land Use Activities and Effects Upon Shallow Aquifer Recharge**

- Irrigation Practices and the Importance of Irrigation Infrastructure for SAR
- Land Use Considerations in Evaluating Impacts to Shallow Aquifer Recharge

## **Evaluation Strategies**

- Practical Mapping – Channel Migration Zones and Floodplain Connectivity

## **Implementation Alternatives in Stream / Floodplain Restoration**

- Stream Channel Restoration and Practical Applications to Enhance SAR
- Enhancing Base Flows and Stream Channel Morphology through Beaver Analogue Structures

## **Policy Considerations**

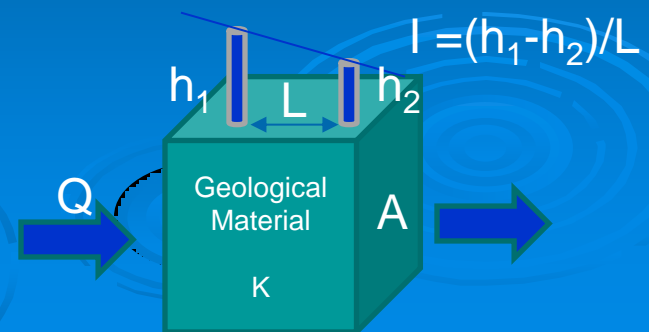
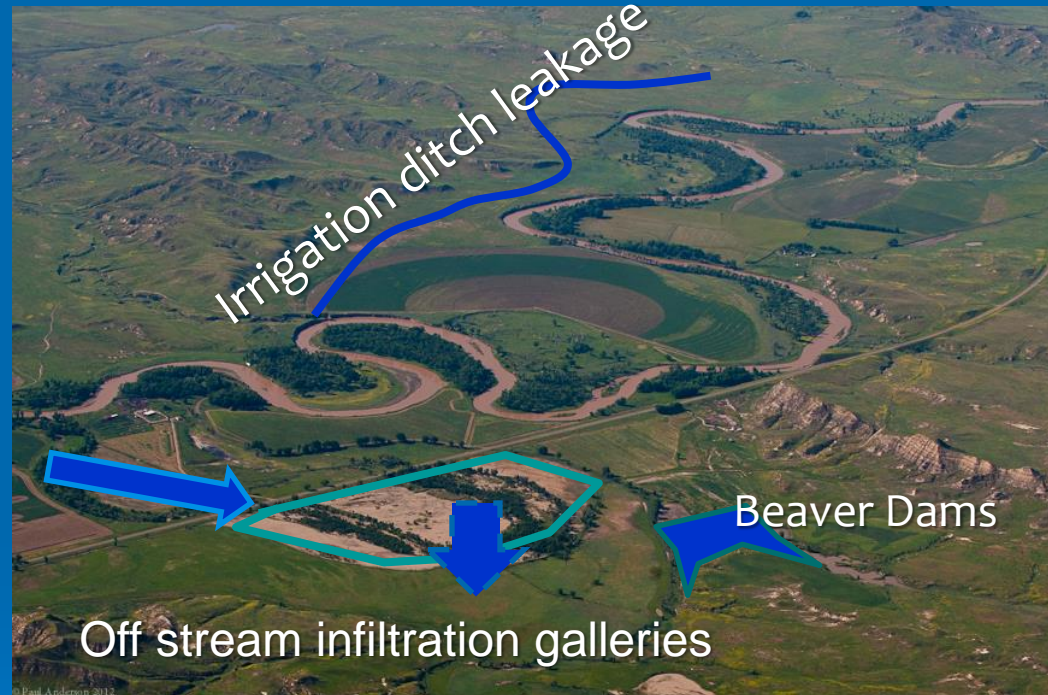
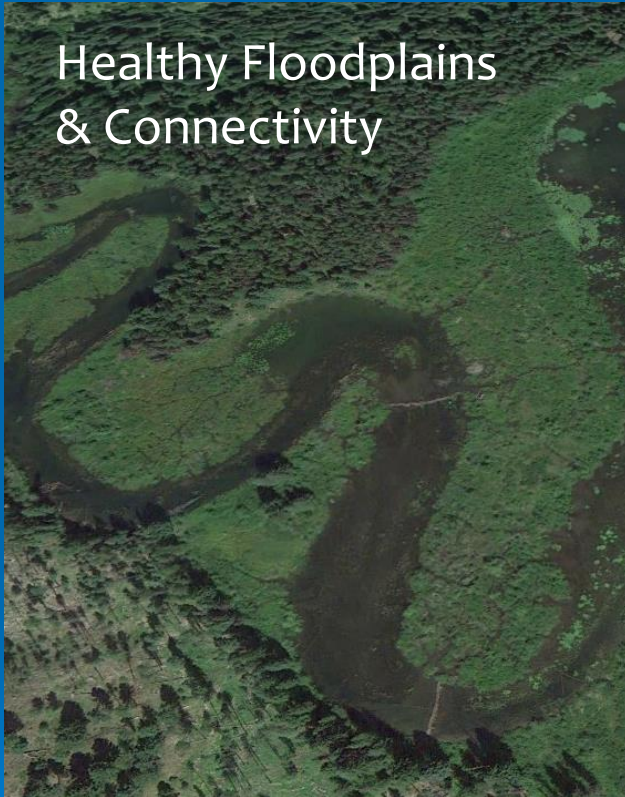
- Floodplain Projects and Riparian Management
- Water Right Implication of SAR Projects - DNRC Guidance on Water Rights for Stream and Wetland Restoration Projects



# Influencing Availability through Water Balance: Only so much water available to manage... as you know

$$In = Out \pm \text{storage change}$$

Healthy Floodplains  
& Connectivity





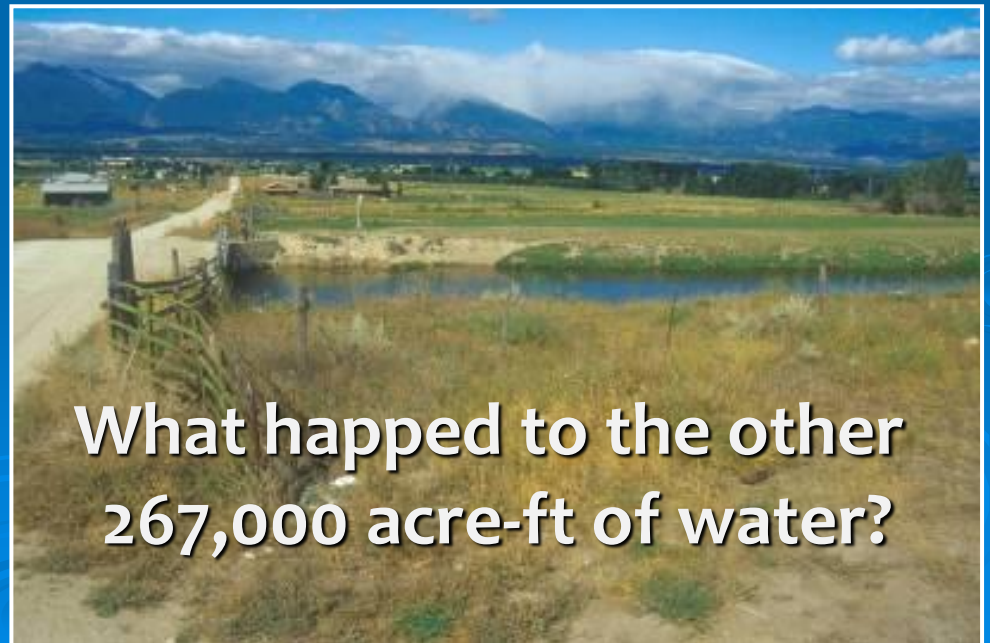
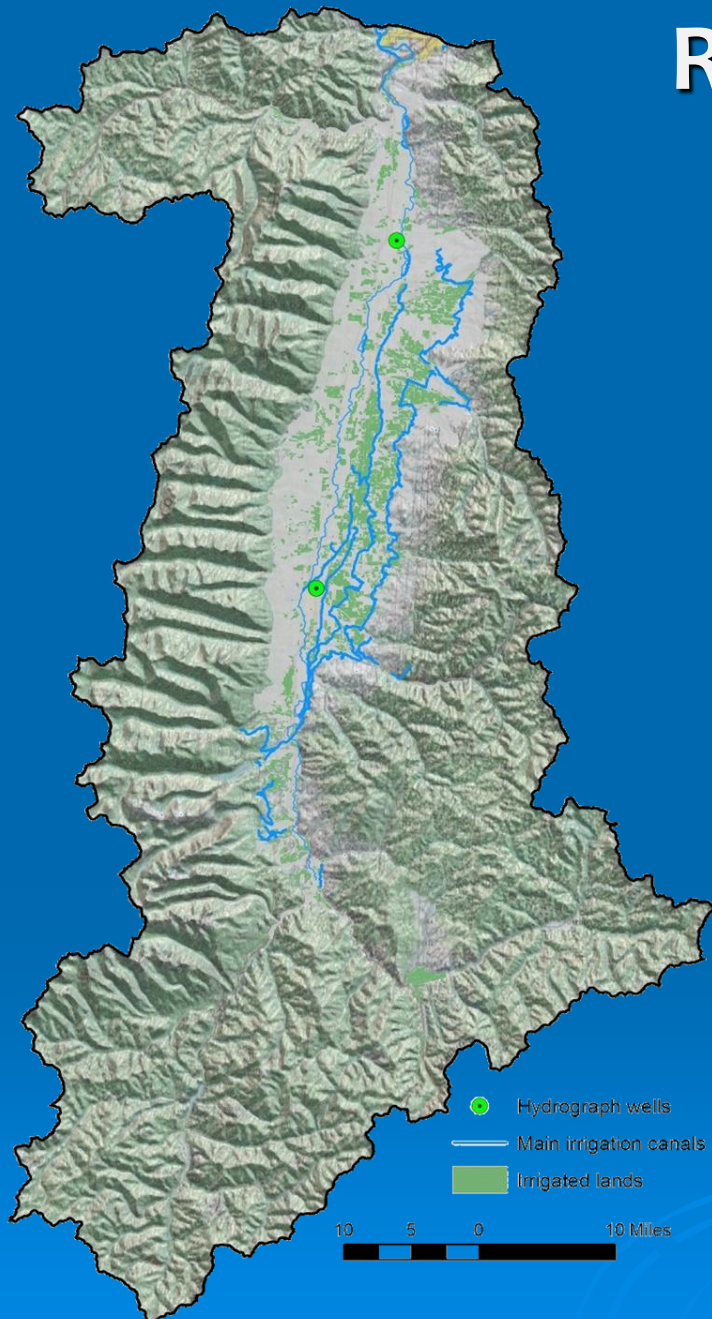
# Role of Irrigation in SAR

## Bitterroot Valley

85,000 acres of irrigated land

374,000 acre-ft of water diverted  
(~4.5 ft of water per acre)

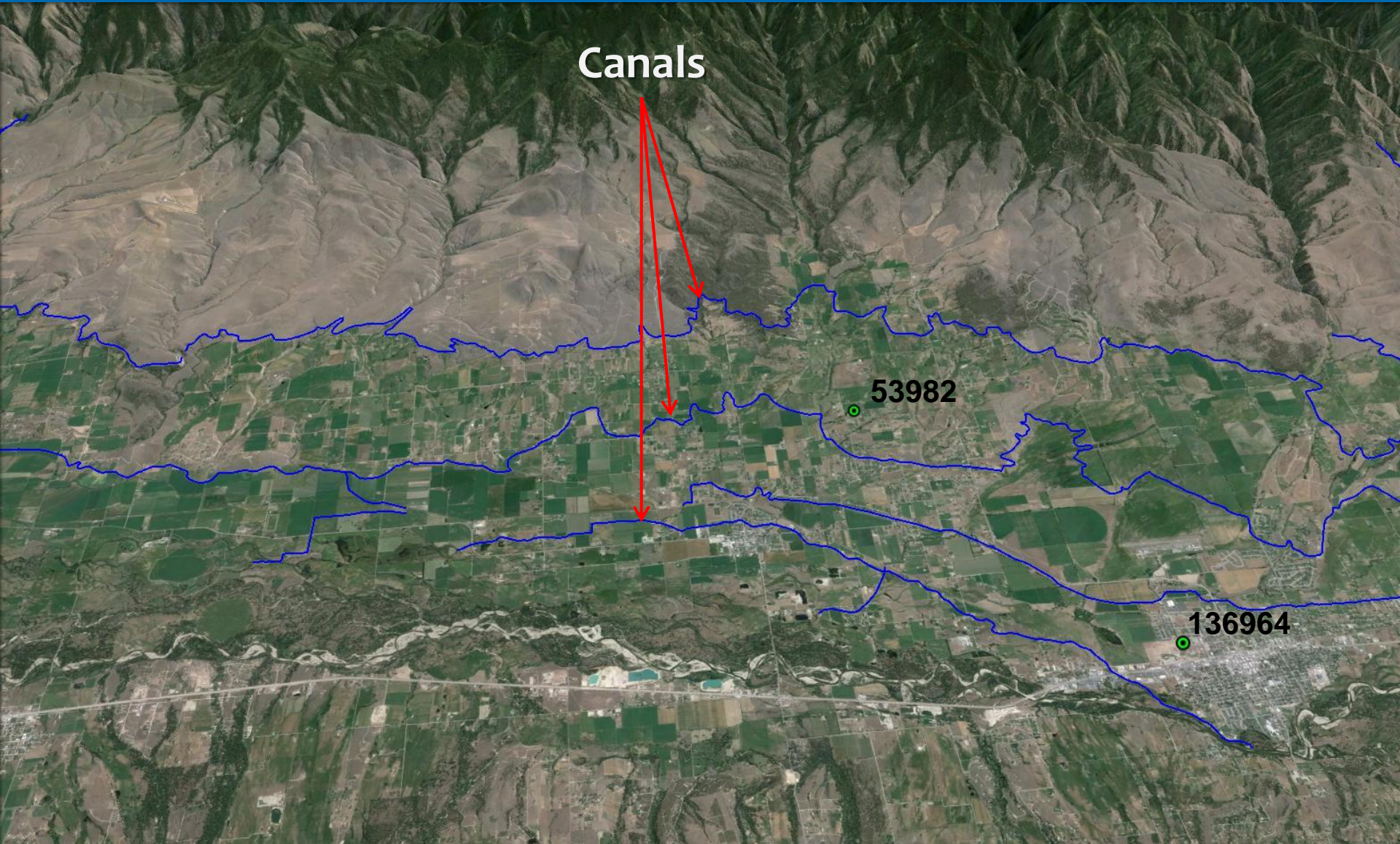
107,000 acre-ft consumed  
(~1.3 ft of water per irrigated acre)



What happened to the other  
267,000 acre-ft of water?



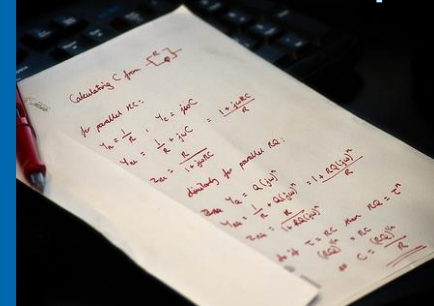
# Irrigation leakage: Dependent systems





# Irrigation leakage: How much?

Back of the envelope



## Bitterroot Main Canal

- 77 miles mostly unlined

## Seepage loss

- ( $\sim 1$  cfs/mile)

$$77 \text{ cfs} = \sim 150 \text{ ac-ft/day} = 50 \text{ MGD}$$

## Irrigation season

- April 15 – Sept 15 (150 days)

Main Canal seepage loss = 7.5 Billion gal/season

Ravalli Co. GW withdrawals = 3.4 Billion gal/year

# Some Things to Keep In Mind

## Traditional irrigation:

- consumptively uses relatively little water as compared to diverted
- is largest source of aquifer recharge
- has created/enhanced wetlands and baseflows
- has contributed to high water tables (source of readily available water for domestic/commercial uses)

Changes are good for some resources and users, bad for others

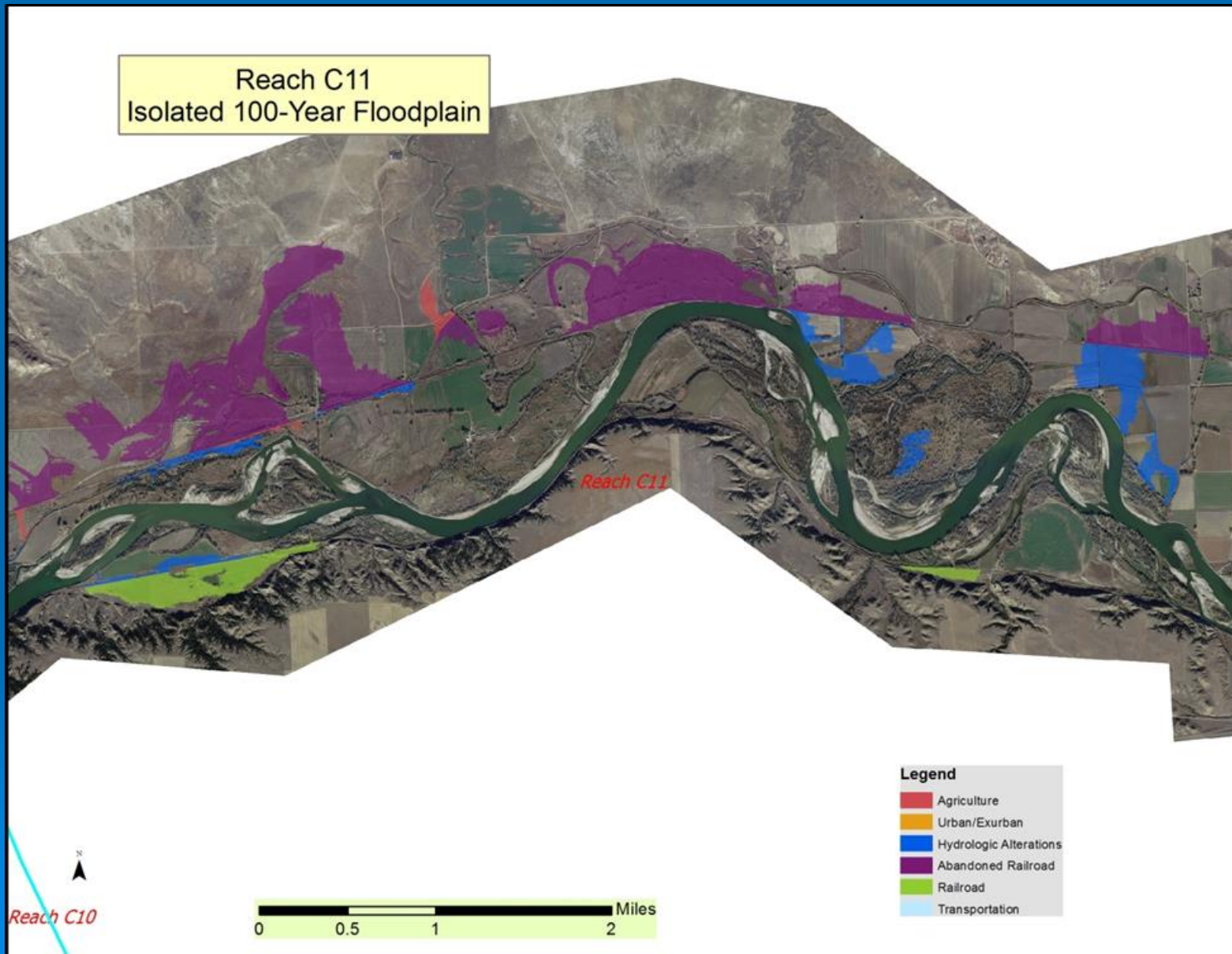
Changes in irrigation have largest effect, but development has:

- decreased use of canal system
- increased use of groundwater

## Recommended Steps:

- increased coordination between land-use planning and water resources planning/management.

# Evaluating Opportunities for SAR / Floodplain Restoration





<http://www.yellowstonerivercouncil.org>

- Cumulative Effects Analysis
- Yellowstone River Recommended Practices Practical Applications





# Passive Techniques to Enhance SAR and Floodplain Connectivity



Photo: Jeff Burrell  
Wildlife Conservation Society





**Direction Control**

**Speed control & deposition**

Photo: Jeff Burrell  
Wildlife Conservation Society



# Norwegian Creek

Spring 2013



## Project Objectives

- Reverse Channel Incision
- Restore Riparian Vegetation
- Improve Fish and Wildlife Habitats











Before



Progress



Spring 2013

Late Summer 2015





## Progress


Bed aggradation: +5 ft

Near stream GWT: +5 ft

Flow: +5 cfs (from 3 to 8)  
(Late summer flow)



# Policy Considerations

- All Floodplains Subject to Local Ordinance.
  - Water Right Considerations
    - Pigs get fat
    - HOGS GET SLAUGHTERED
    - DNRC Guidance – Water Rights for Wetland and Stream Restoration Activities.
- 



# Next Steps:

- Study and Quantify Floodplain Storage Availability
- Develop Protocol for Prioritizing Wetland and Floodplain Restoration for Water Storage
- Analysis of cost/benefit of Natural Storage Water management.
- Development of Monitoring Protocol for Natural Storage Projects
- Protocol and BMP's for Natural Storage Projects



- Questions?



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